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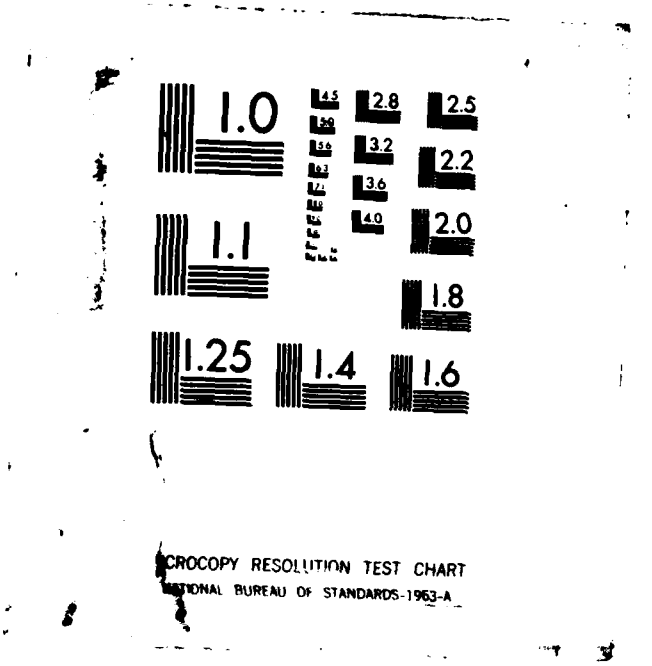
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AN INTEGRATED BIBLIOGRAPHIC INFORMATION SYSTEM: CONCEPT AND APPLICATION FOR RESOURCE SHARING IN SPECIAL LIBRARIES

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Defense Technical Information Center

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The Defense Department Scientific and Technical Information (STI) network is composed of over 200 technical libraries and information centers tied together by the Defense Technical Information Center (DTIC). As the ~~Defense Department~~ clearinghouse for STI, DTIC seeks to improve the flow of information throughout the STI network by promoting shared cataloging and integrated retrieval systems. Through sponsorship of the Local Automation Model project, DTIC will offer libraries and information centers a fully resident computer system supporting local collection cataloging, retrieval, and circulation management and control. What sets the system apart from others is the additional capability offered by an intelligent gateway: the ability to interconnect and share information with geographically remote, heterogenous computers and databases. By combining local collection management capabilities with an intelligent gateway, users simultaneously access and search diverse bibliographic resources - a local catalog, closed community resources, and commercial databases.

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Furthermore, libraries and information centers can readily share bibliographic citations, thus reducing ~~the~~ duplication of intellectual and manual effort associated with acquiring new STI holdings. The prototype system will be operational during 1986, providing the opportunity to demonstrate library automation concepts that will shorten the time required to acquire and disseminate STI. The result will be improved productivity for the Defense Department scientific and technical community - reduced duplication of research, more rapid application of new technology, and timely breakthroughs based on fundamental research findings.

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An Integrated Bibliographic Information System:

Concept and Application for Resource Sharing In Special Libraries

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ABSTRACT

The Defense Department Scientific and Technical Information (STI) network is composed of over 200 technical libraries and information centers tied together by the Defense Technical Information Center (DTIC). As the Defense Department clearinghouse for STI, DTIC seeks to improve the flow of information throughout the STI network by promoting shared cataloging and integrated retrieval systems. Through sponsorship of the Local Automation Model project, DTIC will offer libraries and information centers a fully resident computer system supporting local collection cataloging, retrieval, and circulation management and control. What sets the system apart from others is the additional capability offered by an intelligent gateway: the ability to interconnect and share information with geographically remote, heterogeneous computers and data bases. By combining local collection management capabilities with an intelligent gateway, users simultaneously access and search diverse bibliographic resources – a local catalog, closed community resources, and commercial data bases. Furthermore, libraries and information centers can readily share bibliographic citations, thus reducing the duplication of intellectual and manual effort associated with acquiring new STI holdings. The prototype system will be operational during 1986, providing the opportunity to demonstrate library automation concepts that will shorten the time required to acquire and disseminate STI. The result will be improved productivity for the Defense Department scientific and technical community – reduced duplication of research, more rapid application of new technology, and timely breakthroughs based on fundamental research findings.

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SECTION I. ENVIRONMENT AND OPERATIONS

Since fiscal year 1981, the Department of Defense has budgeted $195 billion for research, development, test, and evaluation (RDT&E). This amounts to almost 11 percent of the entire Department of Defense budget for fiscal years 1981 to 1987 [1]. These funds represent the continuing commitment of the Federal Government to advancing the state of scientific and technical knowledge supporting the U.S. defense program. Research and development projects are conducted and sponsored by the Military Departments (Army, Navy, and Air Force) and selected Defense Department agencies. There are over 200 technical libraries and information centers located throughout the United States supporting the DoD research centers and laboratories conducting research projects.

While the technical libraries all operate within the Department of Defense, each library is unique in responding to the management direction and patron needs of the laboratory or research center it supports. Each library reflects the emphasis and orientation of the research work it supports; this results in a wide range of library sizes, a variety of operating conditions and methods, and diverse, unique local collections. What these libraries have in common is the need to integrate bibliographic resources from three distinct sources. First, each library maintains a local collection consisting largely of scientific and technical reports (some of which are classified and restricted in availability), books, serials, and journals. Second, all retrieve citations and order copies of technical reports from a central source within the Department of Defense: the Defense Technical Information Center (DTIC). Third, these libraries search and retrieve from commercially available bibliographic data bases containing information on science, technology, engineering, and other general research areas. It is estimated that there are over 2,800 such data bases available online through commerical and Government sources [2].

The Defense Technical Information Center is the information clearinghouse for scientific and technical information within the Defense Department [3]. In addition to operating an online catalog – the Technical Reports (TR) data base – of citations to over 1.5 million titles, the Center actively seeks ways of improving the flow of bibliographic information within and into the Department of Defense. To this end, the Center sponsors and conducts research and development in areas of information

cataloging and indexing, storage, and retrieval. With the objective of speeding access to scientific and technical information, DTIC sponsors research in organizational programs and complementary computer-based tools for resource sharing within the Defense community. These include (1) development of online data base directories (metadata); (2) common command language-driven access to external, commercial and Government data bases via intelligent gateways; and (3) a shared cataloging program encompassing technical reports produced within the Department of Defense.

Defense Department technical libraries fill two important roles in promoting timely dissemination of current research results. Naturally, the technical libraries support their patrons with traditional reference services: bibliographic searches, preparation of research bibliographies, and development of project reference material. In addition, many technical libraries are charged with distributing technical reports and studies prepared by the staff of the laboratory or research center supported by the library.

In general, publications originated by the supported laboratory or research center are cataloged and shelved at the supporting technical library. Working in conjunction with the Defense Technical Information Center, the libraries are contributing directly to the centrally maintained TR data base through shared cataloging. This program is called the Shared Bibliographic Input Network (SBIN) [4]. Since fiscal year 1982, SBIN has accounted for about 7 percent of the document citations entered in the TR data base. Since fiscal year 1982, the number of sites participating in the SBIN program has grown from 30 to 71, yet the level of input remains about the same: 1,800 to 2,200 citations per year [5]. This is due to the fact that SBIN participation is a duplication of effort for most libraries: a citation is entered into a local catalog then reentered (in compliance with a different set of cataloging rules governing format and subject indexing) a second time in the TR data base.

It is estimated that SBIN sites could contribute anywhere from one-third to one-half of all citations entered in the TR data base [6]. if the duplication of effort could be eliminated or reduced significantly. This means more citations reaching the central data base sooner, contributing to timely dissemination of and expanded, rapid access to new technical information.

Despite the diversity in organization, management, and patron orientation, technical libraries perform the same basic functions as any other library: cataloging, reference, circulation management and control. A local collection, tailored to patron needs, provides the core resources. In general, all DoD technical libraries rely on the DTIC TR data base as the online reference source of DoD-related technical report citations. In addition, most libraries rely on commercial bibliographic sources—DIALOG, BRS/SEARCH, LEXIS/NEXIS, OCLC, ORBIT—and other Government data bases—chiefly NASA RECON and the Department of Energy RECON—to meet patron demands for information. Regardless of the size, each technical library must maintain and exercise a range of bibliographic resources to meet patron needs.

Blending together the mix of resources required by Defense Department technical libraries complicates the process of developing automated systems to support library operations. While the process is further complicated by the nature of the local collection—technical reports vs. monographs, restricted vs. open access to holdings—there are clear advantages to pursuing integrated systems for technical library automation. Through integration, local collection access can be linked with access to external resources—Government or commercial—providing a powerful reference tool well suited to meet the special demands of closed and open literature access.

Furthermore, the manual and intellectual effort spent on cataloging locally produced technical reports can be shared with other libraries through shared cataloging. That is, given the citation is created and entered into a local catalog, the computer can be used to translate or reformat the citation (if necessary because of different catalog formats and cataloging rules) and transmit the citation to a central data base such as the DTIC Technical Reports data base. Once entered into the Technical Reports data base, other members of the technical and scientific community have almost immediate access to the latest research results, within the limits of their respective authorizations for access.

The challenge in developing and implementing automated systems for DoD technical libraries centers on integrating local collection management functions (reference, cataloging, and circulation) with access to external resources (both for reference and shared cataloging). This extends the concept of integrated library systems to encompass access to external resources. With such a system, library staff

members can effectively and economically provide comprehensive, broad-based reference services taking advantage of diverse resources. Shared cataloging takes full advantage of local library resources and eliminates duplication of intellectual and manual effort in the cataloging process. Timely dissemination of current research findings is the result.

SECTION II. TECHNICAL LIBRARY CHARACTERISTICS AND REQUIREMENTS

As part of the requirements definition for an automated system to support Department of Defense technical libraries and information centers, the Logistics Management Institute conducted a survey of DTIC users. Users were asked to rank automated system features by order of importance and provide information on library characteristics. (Copies of the survey results are available by writing to any of the authors.) This section contains a summary of the survey results, highlighting required automated system characteristics. Survey questionnaires were sent to 238 organizations, 85 responded:

Defense Agencies	11
Department of the Army	36
Department of the Navy	23
Department of the Air Force	15
Total	85

Required System Functions

Libraries responding to the survey ranked the following functions as essential or useful in an automated system (percentages indicate percent of respondents ranking feature as essential or useful):

- Retrieval from a catalog of citations to locally held resources (95 percent)
- Cataloging into a local catalog (94 percent)
- Retrieval from external catalogs or data bases (89 percent)
- Circulation management and control (86 percent)
- Acquisition control and support (78 percent).

Required System Features

Respondents were asked to rank 25 automated system features as either essential, useful, or marginal. Of the 25 features, the following were ranked in the top 10 as either essential or useful (percentages indicate the percent of respondents rating the feature as essential or useful):

- Provide extensive citation searching capabilities, both text and numeric values (96 percent)
- Provide formatted, "fill-in-the-blanks" screens for cataloging (95 percent)
- Provide access to cataloging and retrieval capabilities offered by the DTIC Defense RDT&E Online System (DROLS) (95 percent)
- Provide concurrent searching of the DTIC TR data base and a local catalog of citations (95 percent)
- Merge search results from a concurrent search of the DTIC TR data base and the local catalog (95 percent)
- Store citations for all library holdings (e.g., technical reports, books, monographs, serials, journals) in a single, local system (94 percent)
- Add new data elements and redefine existing data elements in the local catalog (90 percent)
- Search or command response time of 5 seconds or less (89 percent)
- Backup all files on the local system (89 percent)
- Modify citations retrieved from the DTIC TR data base for addition to the local catalog (87 percent).

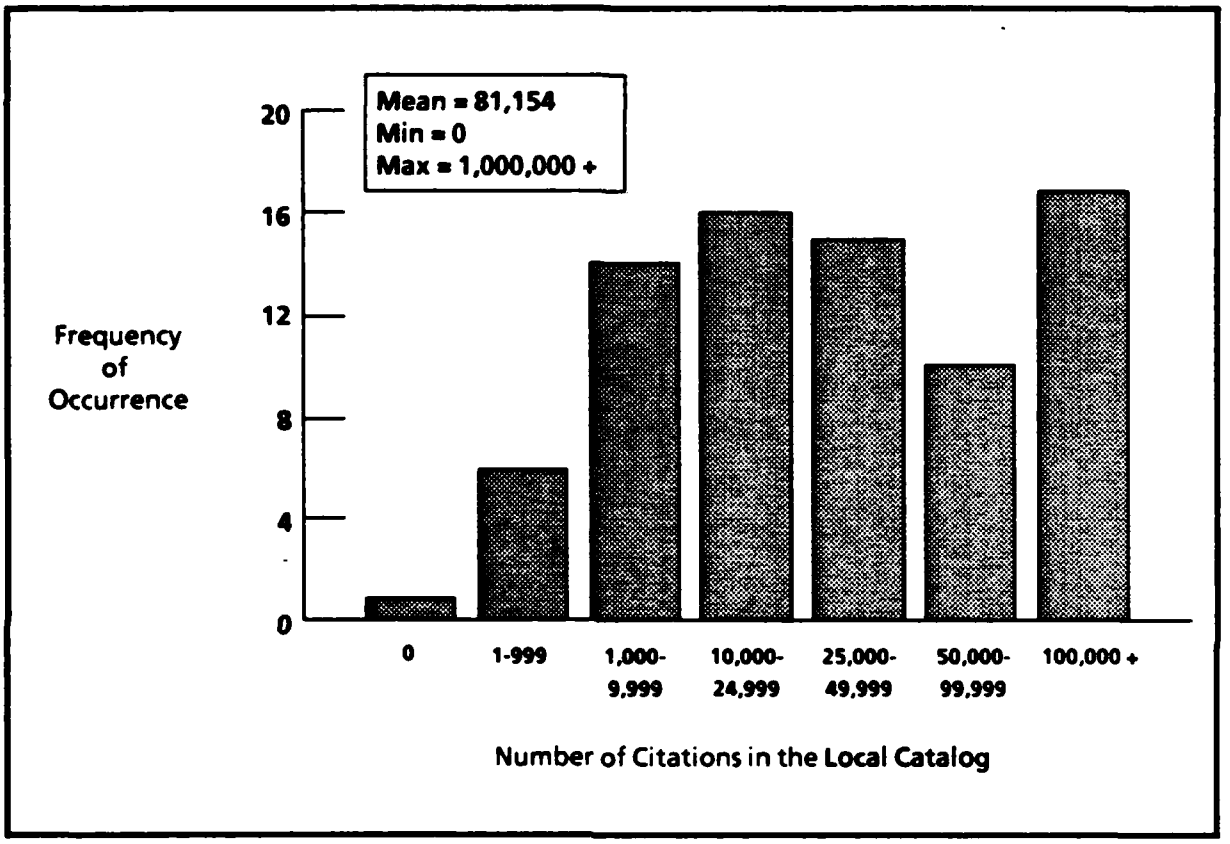
Library Characteristics

The following 12 bar charts provide a summary of the characteristics of the libraries responding to the survey. On each bar chart, the axis labeled "Frequency of Occurrence" depicts the number of survey responses falling within the limits of each individual bar. Blank responses were excluded from the compilation of frequency counts and summary statistics. For each chart except the last, the arithmetic mean of all nonblank responses, along with the lowest and highest values entered, are shown.

Catalog Size. Figure 1 depicts the range of catalog sizes, as measured by the number of citations contained, for the survey respondents. Keep in mind that the size ranges are not the same for each bar. It is estimated that between 200 and 250

megabytes of disk storage would be required for the average-size catalog (2,000 character citations with an overhead allowance of 67 percent).

FIGURE 1. SIZE OF THE LOCAL CATALOG



Cataloging Rates. The rate at which libraries catalog new holdings is depicted in the next series of four bar charts. Figure 2 illustrates the distribution of cataloging frequencies for technical report citations. These are citations entered in a local catalog by the library staff.

Figure 3 shows cataloging frequency distributions for book or monograph citations entered in a local catalog. Figure 4 depicts the frequency distribution for the number of serial issues cataloged per week. Figure 5, covering cataloging, shows the distribution of citations entered into the DTIC TR data base by SBIN participants. The summary statistics for citations input to the DTIC TR data base differ significantly from the actual record of performance measured by DTIC. (By

FIGURE 2. NUMBER OF NEW CITATIONS ENTERED PER WEEK: TECHNICAL REPORTS

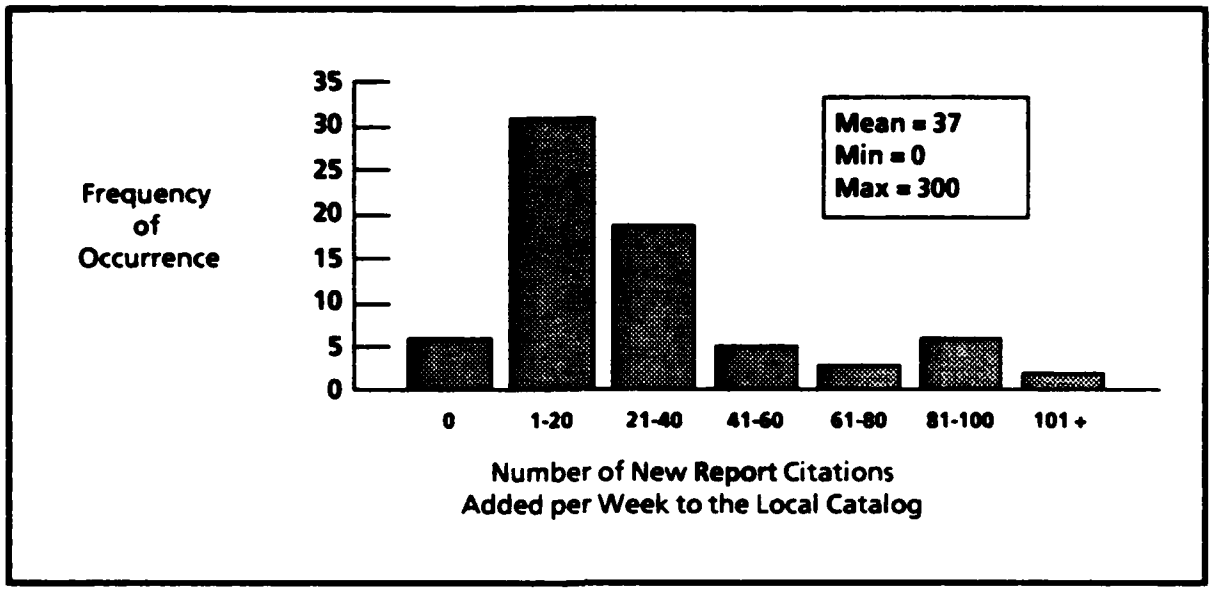
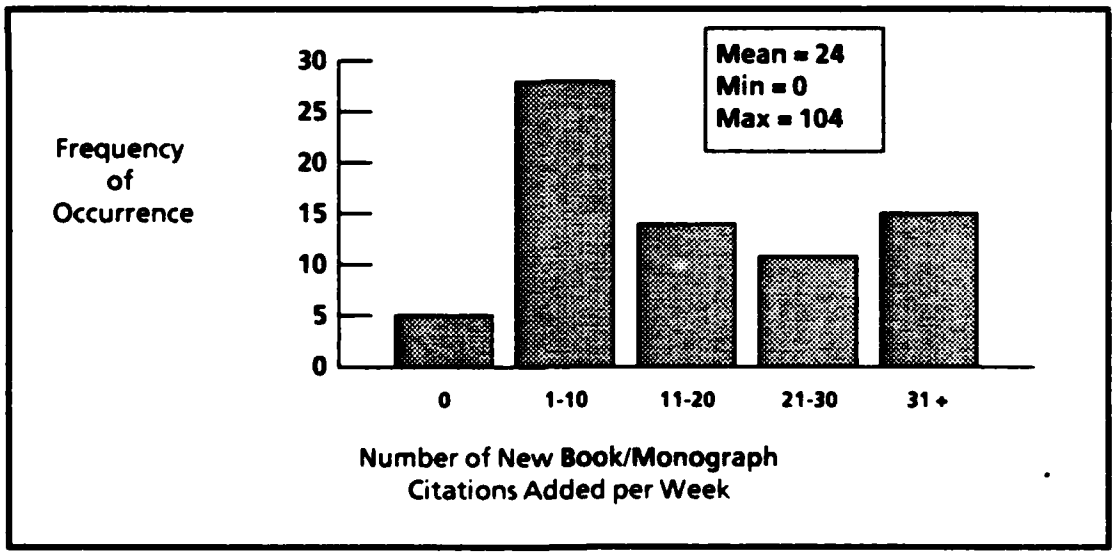


FIGURE 3. NUMBER OF NEW CITATIONS ENTERED PER WEEK: BOOKS /MONOGRAPHS



actual measurement, the average number of citations input per week by each SBIN member is less than one.)

Reference Services. To many patrons, the technical library represents the primary source of technical and scientific information. To meet patron needs,

FIGURE 4. NUMBER OF NEW CITATIONS ENTERED PER WEEK: SERIALS

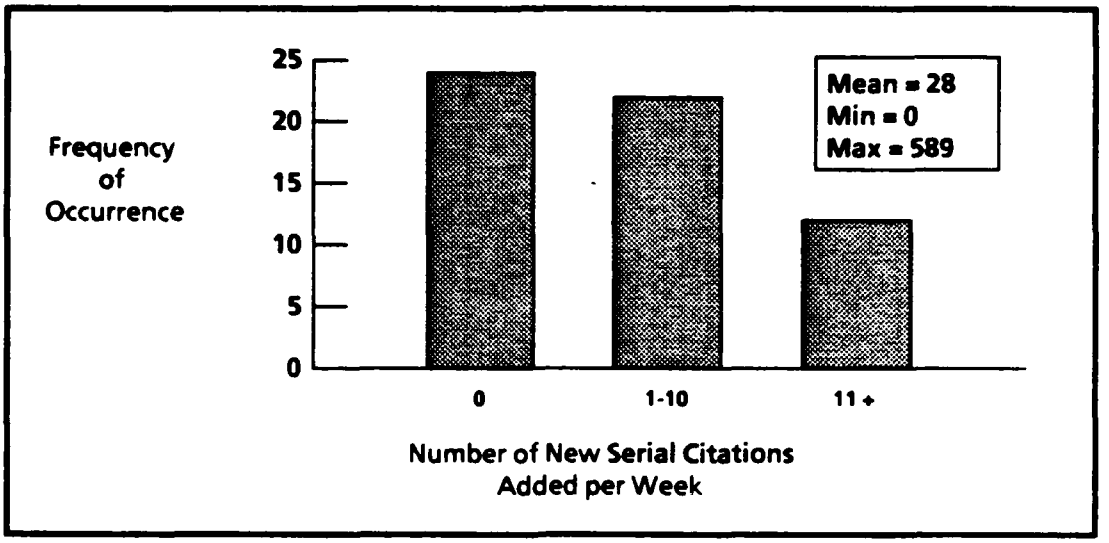
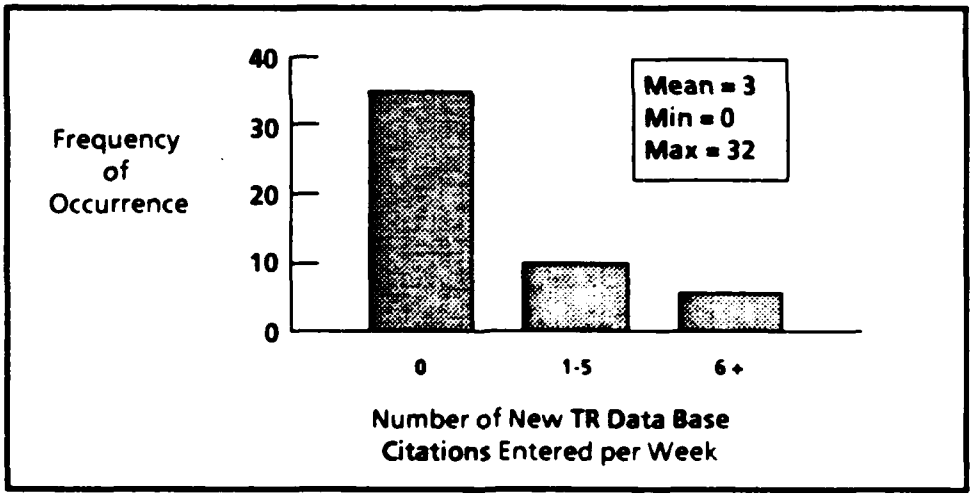


FIGURE 5. NUMBER OF CITATIONS ENTERED IN THE DTIC TR DATA BASE PER WEEK: SBIN PARTICIPANTS ONLY



librarians use a mix of sources, as depicted in the following bar charts. Figure 6 shows the frequency distribution of searches conducted per week using the local catalog. Figure 7,depicts the number of reference searches conducted per week using the DTIC TR data base. Finally, Figure 8 shows the distribution of searches performed using other commercial and Government data bases. On average, libraries rely primarily on a local catalog followed by equal use of DTIC and all other online sources of information.

FIGURE 6. NUMBER OF REFERENCE SEARCHES PERFORMED PER WEEK: LOCAL CATALOG

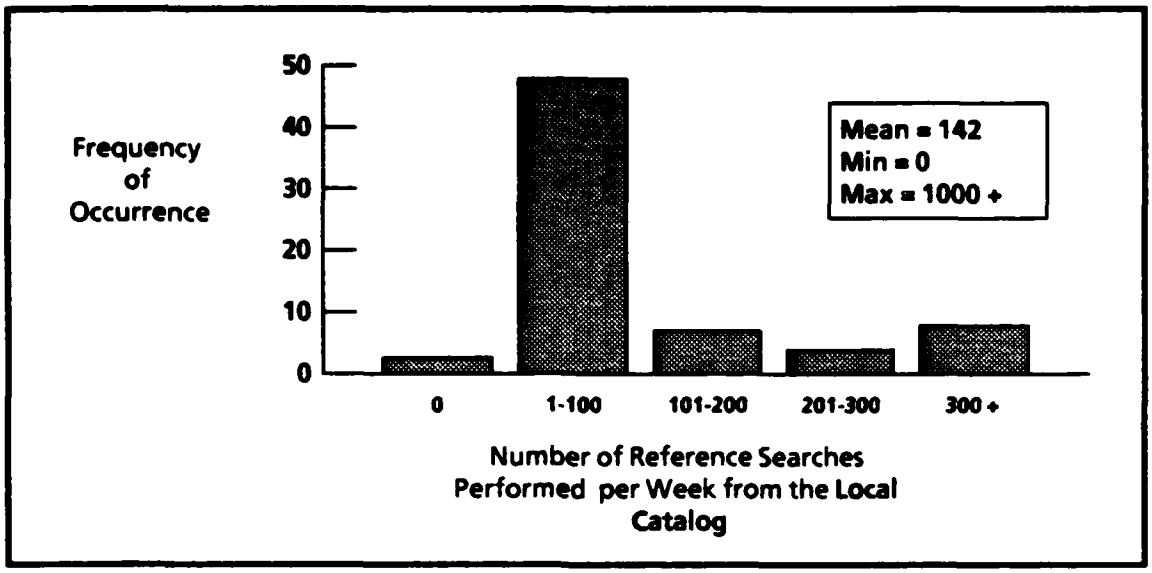
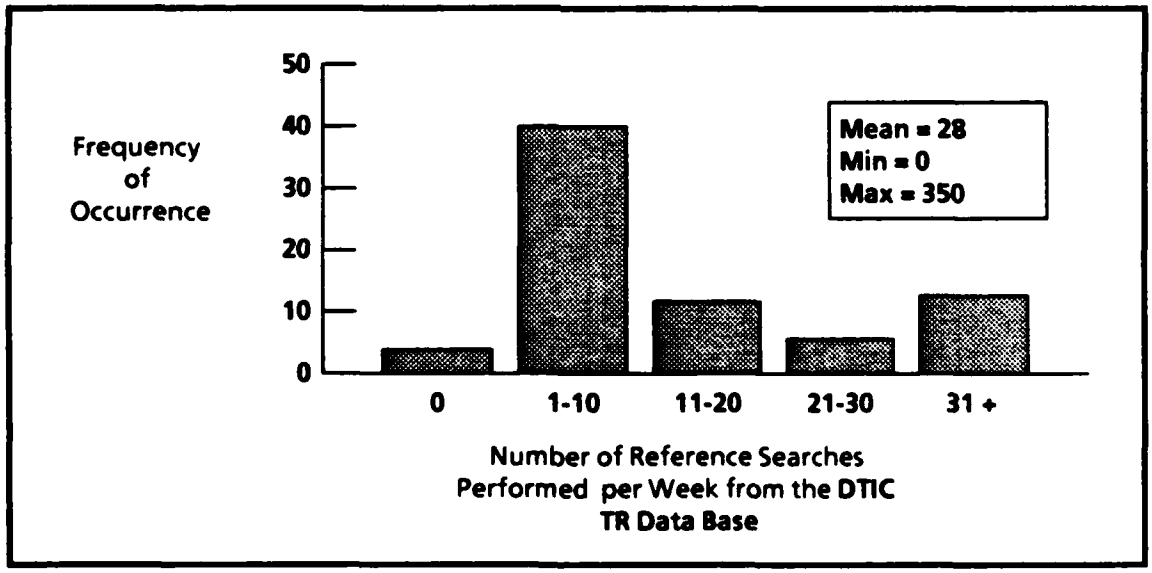


FIGURE 7. NUMBER OF REFERENCE SEARCHES PERFORMED PER WEEK: DTIC TR DATA BASE



Circulation Workload. Inventory control consumes a significant share of technical library resources. Not only must holdings be accounted for to safeguard the collection, but, in many instances, to safeguard national security. Regulations governing handling, distribution, and accounting for classified and limited distribution documents create an additional workload (beyond that of an equivalent academic or corporate technical libary) for the Defense Department libraries.

FIGURE 8. NUMBER OF REFERENCE SEARCHES PERFORMED PER WEEK: OTHER BIBLIOGRAPHIC SERVICES

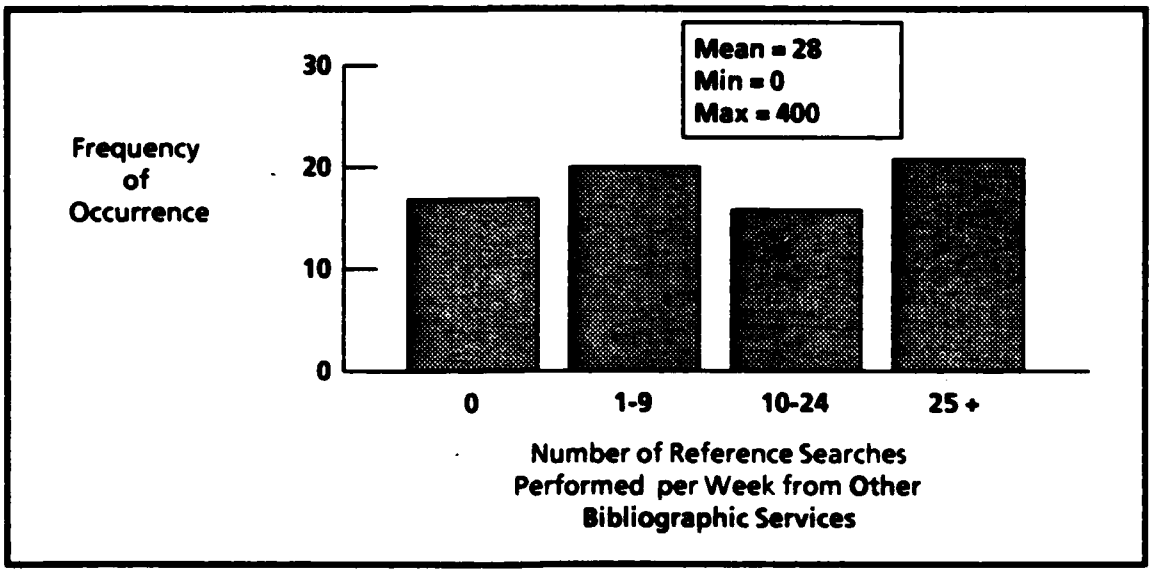
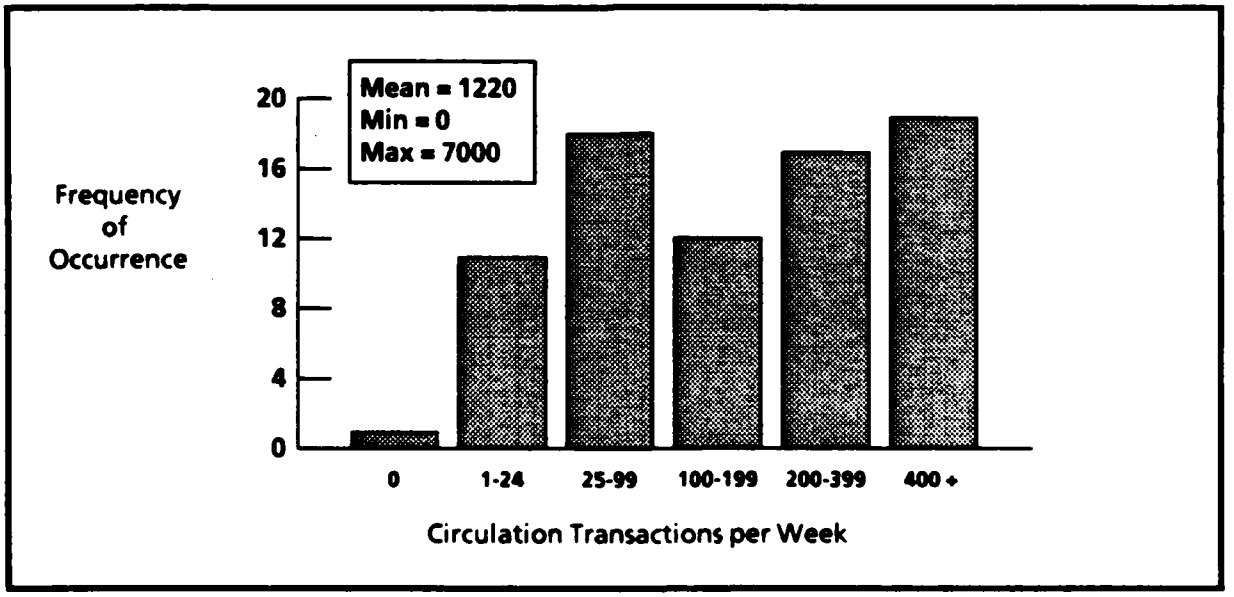


Figure 9 illustrates the range of circulation transactions (charges and discharges of holdings) for libraries responding to the survey. In many instances, these

FIGURE 9. NUMBER OF CIRCULATION TRANSACTIONS PER WEEK

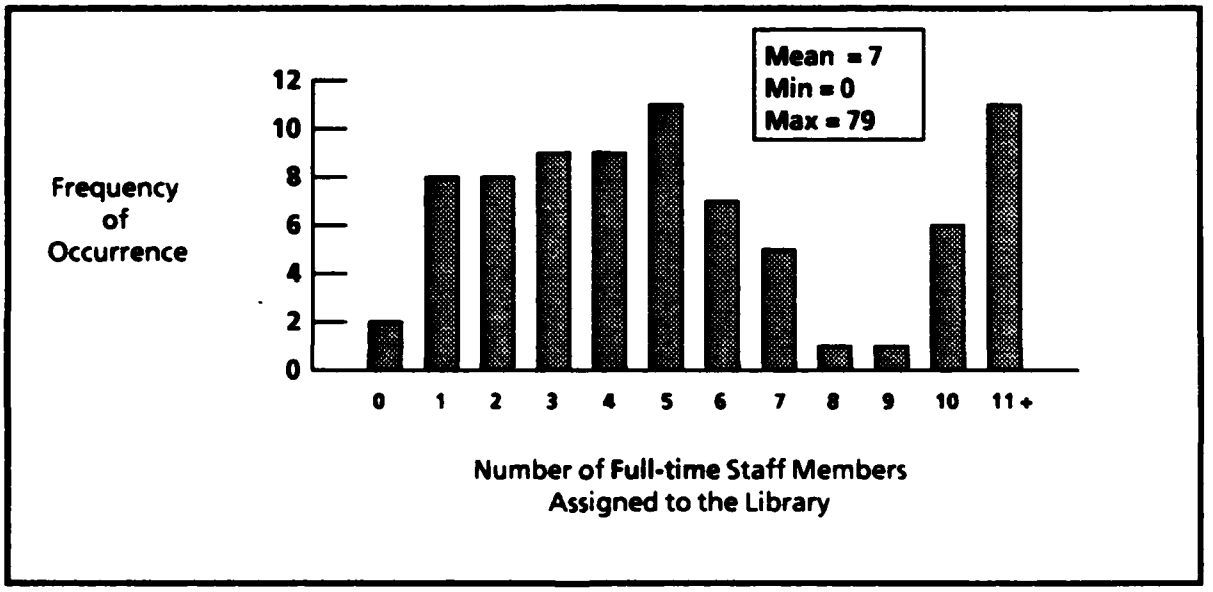


transactions require preparation of a form for signature by the patron receiving classified and limited distribution documents. Largely a manual effort today,

significant savings in staff time and improved service levels are possible through improved automation support for circulation management and control.

Library Staffing. The key ingredient in effective library operations is the staff: information specialists, catalogers, technicians, and managers. Defense libraries use a mix of full- and part-time staff to meet patron needs for service. Figures 10 and 11 show the distribution of full- and part-time staffing for libraries responding to the survey.

FIGURE 10. LIBRARY STAFFING: NUMBER OF FULL-TIME STAFF MEMBERS



External Information Sources. Survey respondents were asked to check the bibliographic services presently used or planned to be used by the library. Almost every library responding to the survey used either DIALOG, OCLC, or both. Figure 12 summarizes the use of external bibliographic sources by Defense libraries and information centers. The "Other" category depicted is composed of NASA RECON, DoE RECON, and 11 other services, each named once in survey responses.

FIGURE 11. LIBRARY STAFFING: NUMBER OF PART-TIME STAFF MEMBERS

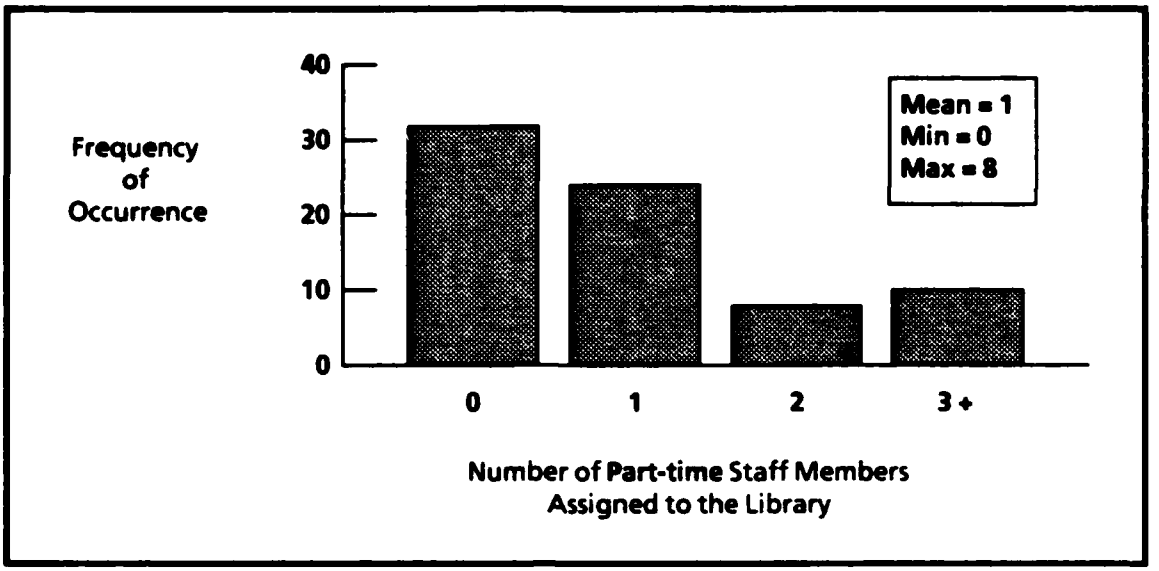
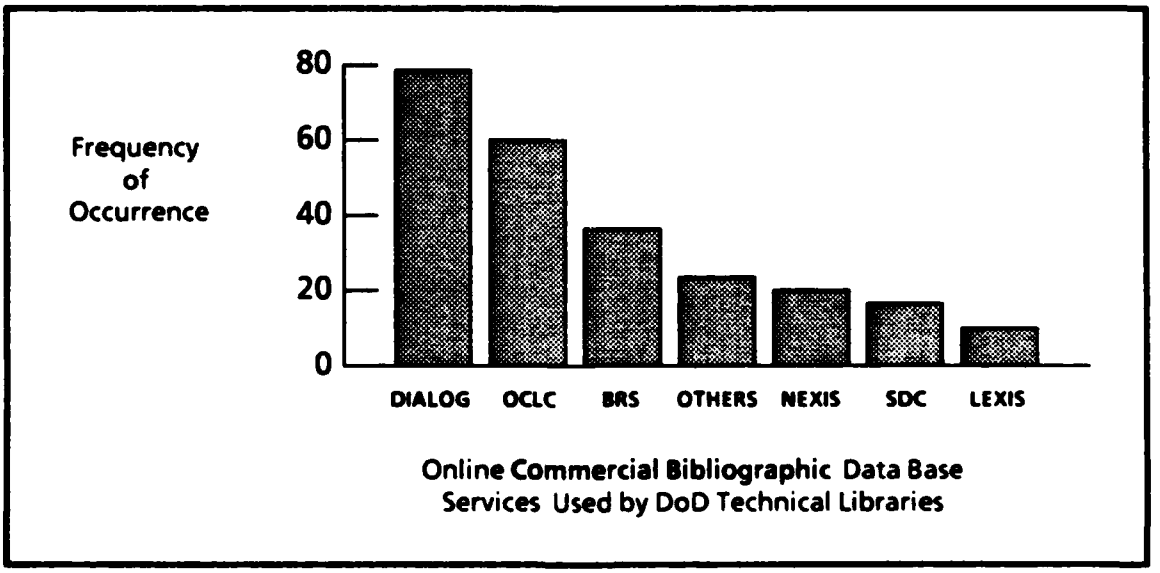


FIGURE 12. USE OF COMMERCIAL BIBLIOGRAPHIC SERVICES



SECTION III. SYSTEM CONCEPT, CHARACTERISTICS, AND DEVELOPMENT

While defining the characteristics of an integrated system for technical library automation appears straightforward, a survey of existing software products yields that no single commercial or public-domain system provides the capabilities needed to implement the concept. All the technology (software, hardware, and telecommunications), however, does exist. What is needed is an approach for modifying (as required) and assembling the available technologies into a truly integrated system running on one computer and accessible by any user over a single video display terminal. Development and demonstration of a system meeting these requirements became the objective of the Local Automation Model project.

The Defense Technical Information Center initiated project development at the request of Shared Bibliographic Input Network member libraries [4]. The shared cataloging experiment was burdening technical libraries in that holdings (technical reports) had to be cataloged twice—once in the local catalog and then again for the Technical Reports data base. While DTIC was benefiting from technical libraries sharing cataloging responsibilities, the libraries appeared to bear the burden of effort disproportionately to the apparent benefits.

Serving as the focal point for the development effort, DTIC contributed a significant portion of the initial funding, supervised the day-to-day activities of the project, and coordinated the involvement of over 20 technical libraries. As such, DTIC shouldered the initial risk of project development, offsetting some of the burden placed on technical libraries already participating in shared cataloging. As a result, no single library would have to bear the risk of system development, broadest possible user participation was encouraged, and scarce system development resources were focused on a problem likely to yield significant payoffs throughout the Department of Defense technical and scientific community.

The primary objective of the Local Automation Model project is to demonstrate the concept of an integrated system performing local collection management functions coupled with access to external bibliographic resources. The result of the project would be a local computer system available for implementation by SBIN member libraries. The project was structured in phases consistent with a typical automated system development life cycle: requirements definition, concept

development, system design, concept demonstration, system acquisition and implementation, and system operation and maintenance. Work on requirements definition began in November 1982, with concept demonstration via implementation of a prototype system originally scheduled for June 1985.

Requirements definition began with visits to representative libraries to conduct interviews with staff members. A list of system requirements and features was prepared and included in a survey sent to 35 libraries participating in the Shared Bibliographic Input Network program. Twenty-five libraries responded to the survey. Respondents indicated the requirements and features considered essential for the system and ranked the requirements and features in order of priority of need.

Based on the requirements and priorities established through the survey, a design concept for the system was formulated. The design concept described the requirements to be included in the system and laid out a structure for the system. The design concept was documented and sent to survey respondents for comment [7]. Comments were incorporated in subsequent design work on the system.

Design of the system continued with development and publication of a Functional Description [8]. The purpose of this document was to convey to the user community and potential system developers the characteristics and performance of the system. Within the Functional Description, the software architecture for the system was defined. The operating environment was discussed along with a statement of hardware features and characteristics needed to operate the system. The development approach for the remainder of the project was outlined in the Functional Description also. The technical library at the Defense Nuclear Agency in Alexandria, Virginia, was designated as the test site for the prototype system. As before, the document was sent to participating technical libraries for review and comment.

At this point, the general system characteristics and capabilities were fairly well agreed upon. The processing steps and hardware and software requirements were then documented in a System Specification [9]. The System Specification described the detailed processing steps and sequences required to meet user requirements. Coincident with publication of the System Specification, modifications to the remainder of the development schedule were prepared and announced.

Initially, the system development plan called for demonstrating the system concept using a public-domain library system widely known throughout the user community. The package had been modified and enhanced by a commercial vendor who was marketing the package. Unforeseen events halted pursuit of this approach and necessitated selection of an alternative development approach. The immediate problem in pursuing the alternative approach was selecting—from perhaps hundreds of software products—a system suitable for concept demonstration at the prototype site.

On the basis of the requirements and design documented for the system, a survey of available software products was conducted. The purpose of the survey was to determine the suitability of using existing, commercially available systems for the prototype. If existing software was found to be suitable for the prototype, it would reduce the risk and cost asscociated with developing software. A list of 30 critical functions was developed and used to conduct the survey. In all, 66 vendors were contacted and asked to respond to the survey points covering the 30 critical functions. In the first stage of the survey, 33 products were eliminated from consideration, leaving 30 vendors as possible candidates pending further evaluation. Of the remaining 30, six were finally selected as having suitable functionality and offering the requisite features for the prototype system [10].

Performance benchmarking was used to select a package from among the final six for prototype system implementation. A test plan was prepared detailing the evaluation and scoring criteria used for performance benchmarking [11]. Several library software evaluation guides were used to prepare the test plan [12] [13]. Several organizations (the Logistics Management Institute, the Defense Nuclear Agency, the Defense Technical Information Center, and Lawrence Livermore National Laboratory) provided staff members to participate in the evaluation. Each member of the team used the systems and evaluated them against the criteria listed in the test plan. Benchmarking took over 10 months to complete. The UNICORN System from SIRSI Corporation and BRS/SEARCH (Mini/Micro Version) were selected for the prototype.

To provide simultaneous searching of external sources and the local catalog, an intelligent gateway processor will be incorporated in the system. For the prototype system, a subset of the Integrated Information System (IIS)— developed and supported by the Technology Information System group at Lawrence Livermore National Laboratory—will be used [14]. Lawrence Livermore staff members are

participating in the prototype development, providing much of the technical and operational expertise required for software benchmarking, package selection, and integration of the intelligent gateway with local collection management functions.

With an intelligent gateway, users of the local system can be connected to several external systems and data bases via telephone lines. The gateway performs the protocol and syntax translation needed for intercommunication among dissimilar, heterogeneous systems and data bases. Coupled with a common command language—via a custom tailored user interface—the gateway and the library software package are accessible by a user through a single video display terminal providing access to a broad range of information and data manipulation resources.

SECTION IV. PROGRESS AND FUTURE DEVELOPMENTS

Minicomputer-Based System

Implementation planning for the prototype system began in February 1985 and continued through hardware and software installation [15]. Installation of the hardware for the prototype system was completed in March 1986. Software installation and conversion of existing bibliographic and patron files was completed in April 1986. Training for the library staff was conducted concurrent with software installation and testing. Local system functions—reference, cataloging, and circulation management and control—are operational. Installation and testing of the gateway software and hardware will be completed this summer. The hardware configuration for the system is as follows:

- Digital Equipment Corporation VAX 11/750 central processor with six megabytes of real memory, running the UNIX operating system (version 4.2 BSD)
- Two 300-megabyte Winchester technology disk drives with removable head and drive assemblies (for use with classified data)
- One ½-inch magnetic tape drive with selectable recording densities of 1,600 and 6,250 bits per inch
- One high-speed (300 lines per minute) line printer

- Seven VT100-equivalent video display terminals
- Three terminal printers, 200 characters per second print speed
- A secure, asynchronous, 9,600-baud network linking the seven terminals and three printers located in the library with the central processor.

The prototype will be evaluated for 1 year. During that time, other functions may be added, modifications to improve performance and user access made, and other peripheral hardware tested. Experience with the prototype will shape performance requirements and specifications for the production system. Production system acquisition will be accomplished through a centrally managed, competitive acquisition conducted jointly by the Defense Technical Information Center and the Library of Congress Federal Library and Information Network (FEDLINK). The production system will be offered to Federal libraries and information centers in much the same way as other FEDLINK products and services are offered.

Microcomputer-based System

Beyond the 50 to 60 large technical libraries initially targeted by the Local Automation Model project, there are approximately 200 to 300 other DTIC users who could particpate in shared cataloging and benefit from gateway access features for reference work. The challenge becomes that of scaling the software and hardware so that a system—with required features and capabilities—is available for implementation within any size library or information center.

In April 1985, work began on demonstrating the functions and features of the Local Automation Model project on a microcomputer. Building on the results of the Local Automation Model project minicomputer prototype, system requirements and characteristics were established [16], software packages were examined, and candidates selected [17]. A prototype system was installed at the Headquarters, U.S. Army Training and Doctrine Command technical library at Fort Monroe, Virginia. Operation of the local system functions began in March 1986 with implementation of gateway features scheduled for summer of 1986.

The microcomputer version of the system is implemented using the following hardware configuration:

- Altos 2086 central processor with two megabytes of real memory, running the Xenix operating system
- 80 megabyte Winchester technology disk drive with cassette tape input and back-up

- Two IBM-PCs and one Wang PC configured as terminal work stations
- Asynchronous dial-up access for affiliated technical libraries.

Future Developments

While prototype evaluation is well underway, other significant milestones remain. Some of these are readily accomplished within 6 to 12 months, others, because of greater complexity and broader impact, may take longer.

Production System Acquisition. A plan for acquiring the production system must be developed which accommodates the organizational and managerial diversity found in the DoD technical library community. The acquisition strategy must emphasize competition among the host of potential vendors, but must promote open access to technical data covering proprietary vedor software so that integrated products can be delivered.

Expanded Gateway Access. Transferring citations between the local system and the DTIC TR data base—both uploading and downloading—is sufficient for concept demonstration. In practical application as an integrator of all library bibliographic resources, the system must offer the capability of connecting with and downloading citations from other sources. Expansion of the gateway features of the system to include access to other Government and commercial data bases is necessary.

Common Command Language. Hand in hand with the need to expand gateway access to other sources is the need for a common command language across all resources. Each Government and commercial data base has peculiarities that confound command standardization. Each system's unique features may only be accessible through a unique command. However, as access to bibliographic resources expands, the need for even a "lowest common denominator" command set will increase. User demands and economic incentives will guide most commercial suppliers to a common command set or language, if a standard exists. Work by the NISO Z39-G Standards Committee is encouraging in this area [18].

Reduction of Manual Effort. The key to further reductions in manual effort will be found in the use of optical character and bar code readers and in full-text scanning machines. Bar coding and optical character recognition offer the potential for further labor saving in the area of circulation and inventory management. The ability to bypass keyboard entry of information through use of image or text

scanning will speed cataloging and enhance retrieval by encouraging full-text cataloging. Of these, the integration of bar coding offers immediate benefits to users in Defense Department technical libraries.

Full-Text Storage and Optical Disk Technology. Sharing of classified or proprietary information resources requires special safeguards which affect automated system design and operations. Telecommunications safeguards are expensive and in some cases economically unjustifiable for low-volume transaction rates. Rather than distributed processing of classified bibliographic information over telecommunications networks, catalogs can be distributed on optical disk. Given sufficient production volume, copies of large (up to one gigabyte) data bases can be inexpensively produced and distributed on a single optical disk in a form suitable for rapid searching and retreival. With optical disk distribution, libraries will have access to the full text of technical reports, rather than relying on traditional distribution of hard-copy and microfiche media.

Indexing Standardization and Controlled Vocabularies. A standard or common set of index terms and controlled subject terms will be beneficial for shared cataloging and retrieval within DoD activities and organizations. A vocabulary exists today and is in use by DTIC. Technical libraries argue that the terms are too broad for use in local collection cataloging, where a single DTIC term can cover 10 to 25 percent of a local collection's holdings.

Summary

Essentially, the implementation of the prototype systems demonstrates the feasibility of integrating diverse, yet functionally compatible automation resources for special libraries. Ensuring widest possible access to the results of the Local Automation Model project – access to production systems acquired as a result of project research and development – enables individual technical libraries to improve patron services with a reasonable rate of return on system costs and without the risks of going it alone. For the Department of Defense scientific and technical community, implementation of the production systems provides a powerful information management tool supporting timely, comprehensive research, development, and engineering.

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NOTE: All of the publications from the Logistics Management Institute are available to DTIC users through existing document distribution arrangements. The "AD" number, where shown in the preceding references, is the DTIC accession number for ordering copies of documents. Others interested in obtaining copies of these documents should contact the Department of Commerce, National Technical Information Service, Springfield, Virginia.

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